

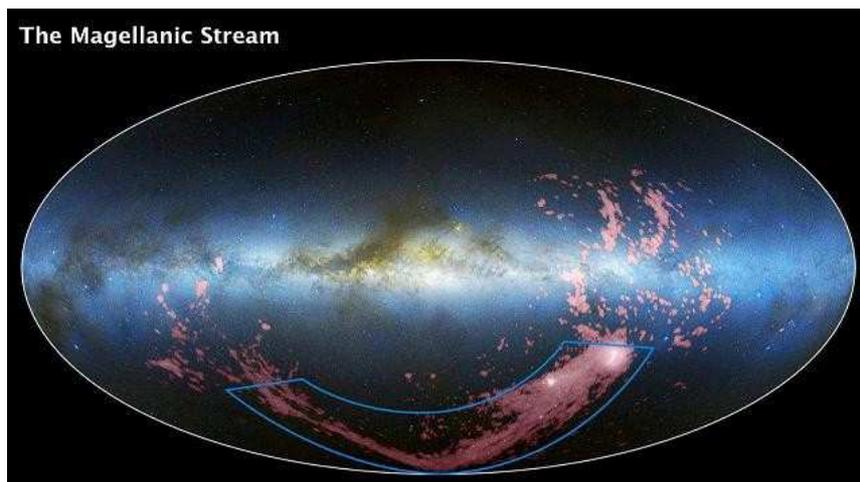
## Press Release

December 2013

### **Discovery of the Source of the Magellanic Stream by the Cosmic Origin Spectrograph (COS – Hubble Space Telescope) equipped with HORIBA Jobin Yvon gratings**

Last August, astronomers using NASA's Cosmic Origin Spectrograph (COS) equipped with HORIBA Jobin Yvon gratings, installed on the Hubble Space Telescope, have solved a 40-year mystery of the origin of the Magellanic Stream. The Magellanic Stream is a long gas area stretching around our Milky Way galaxy.

The Large and Small Magellanic Clouds are two galaxies orbiting the Milky Way. These two galaxies are at the head of the gaseous stream. Since early 1970s, astronomers have wondered whether the gas comes from one or both of the satellite galaxies. The Space Telescope Science Institute (STScI) in Baltimore (MD), who conducts Hubble science operations, have performed the new COS experiments on Hubble. They have revealed the source of the gas filament by measuring the amount of heavy elements (oxygen, sulfur, ...) at six locations along the Magellanic Stream by using the absorption properties of these elements in the ultraviolet spectral range. Andrew J. Fox team from STScI discovered that most of the gas was stripped from the Small Magellanic Cloud about 2 billion years ago. A second region of the stream originated more recently from the Large Magellanic Cloud.



*Astronomers using NASA's Hubble Cosmic Origin Spectrograph have solved a 40-year mystery on the origin of the Magellanic Stream (Image credit: NASA).*

**HORIBA Jobin Yvon company, located in Longjumeau (France), have manufactured from 1998 to 2001 a total of seven space flight diffraction gratings for the Cosmic Origin Spectrograph (COS).** The development of these gratings was the result of a fruitful collaboration between the Center for Astrophysics and Space Astronomy (CASA – Boulder (CO)), led by Professor James Green, and HORIBA Jobin Yvon's team [1]. The space-qualified production process from HORIBA Jobin Yvon was

used to manufacture the three reflection gratings of the COS FUV channel (115-205nm) and the four reflection gratings of the NUV channel (170-320nm). Cutting edge technologies such as high groove density holographic recording, ion-etching, replication processing and new coating treatments were used to achieve the COS state of the art diffraction grating performance.

**HORIBA Jobin Yvon received an Award from NASA for our commitment to excellence and technology achievement.** Prof. James Green, in charge of grating qualification, stated to HORIBA Jobin Yvon's team: "In recognition of your holographic gratings for the COS instrument that will enable a new generation of scientific exploration for the Hubble Space Telescope [...] and every person who looks to the sky in wonder [...] the gratings were delivered above the specification, on time and within cost".

**The COS spectrograph equipped with the seven HORIBA Jobin Yvon diffraction gratings was installed on the Hubble Space Telescope in May 2009. After about 15 years of life with more than four years of operation in a space environment, the gratings have kept their initial high performance and bring to the scientific community extraordinary discoveries such as the origin of the Magellanic Stream.**

HORIBA Jobin Yvon diffraction gratings were previously space-qualified during the Long Duration Exposure Facility (LDEF) NASA mission from 1984 to 1990. Our gratings stayed more than 5 years in orbit and kept the same performance after return on Earth. It is another successful proof here of long life time for space flight gratings from HORIBA Jobin Yvon.

HORIBA Jobin Yvon S.A.S. Company, part of HORIBA Scientific (HORIBA Group), is a world leading supplier of spectroscopy, analytical instruments and diffractive optics for research and industry. HORIBA Jobin Yvon has been selected and participated in a large number of NASA or ESA space-flight missions by developing very high performance diffraction gratings for spectrographs. HORIBA Jobin Yvon designs, manufactures and tests a large range of scientific diffraction gratings for Lasers, Space flight and Synchrotron applications.

[1] James C. Green *et al*, "*The Cosmic Origins Spectrograph*", The Astrophysical Journal, 744:60 (15pp), 2012 January 1. doi:10.1088/0004-637X/744/1/60.

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